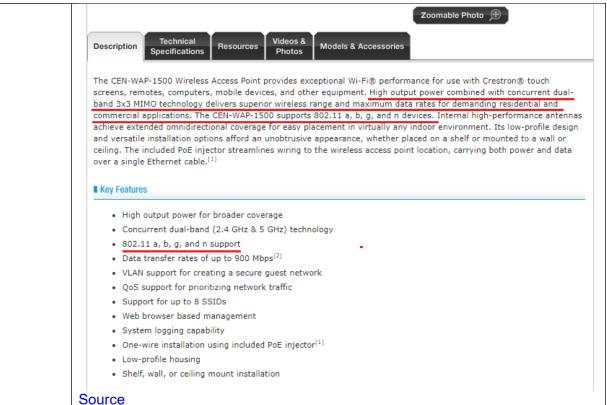
# Exhibit 2

U.S. Pat. No. 6,917,304 v. [Crestron CEN-WAP-1500 High Power Dual-Band Wireless Access Point]





\_\_\_\_\_\_

Data is transmitted through the communications channel (the 2.4 GHz frequency spectrum), at least during internal testing and use, from at least two data sensors to a data processing means, e.g., one or more processing units in the Accused Device. On information and belief, the Accused Device includes processing units that perform its intended function(s).

For example, the network may include a local data sensor (e.g., a weight, impedance, temperature, air pressure, and humidity sensors) located on a 802.11b/g device that communicates with the Accused Product's 2.4 GHz communications channel. The 802.11b/g devices necessarily require a lower throughput than 802.11n devices because the 802.11b/g standard has a maximum throughput that is substantially lower than the throughput allowable using 802.11n.

Exemplary 802.11b/g device with weight and impedance sensors:



https://www.fitbit.com/aria. Additional exemplary802.11b/g sensors include wireless temperature, air pressure, and humidity sensors. http://www.omega.com/pptst/wSeries.html

The network, at least during internal testing and use, may in addition include a second data sensor (e.g., camera sensor as shown in the exemplary 802.11n device below) located on a 802.11n device that also communicates with the Accused Device's 2.4 GHz communications channel. These devices using the 802.11n standard have a higher throughput than is allowed under the 802.11b/g standard.

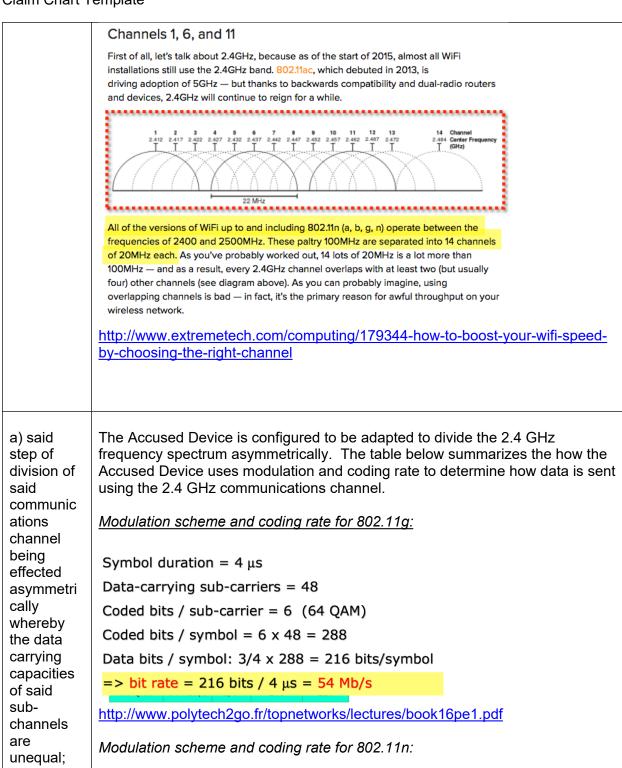
Exemplary 802.11n device with a digital camera and accompanying image sensor (e.g., CMOS, CCD, and other variations):



The cream of the current <u>Fire OS tablet crop</u>, the 8.9-inch device <u>first launched in Sept 2013</u>, and was refreshed this September. with a starting sticker price of \$429 USD. It packs a 2,560 x 1,600 pixel display, a Qualcomm Inc. (QCOM) <u>Snapdragon 805</u> chip (quad-core, 2.5 GHz), 2 GB of LPDDR3, and <u>802.11n Wi-Fi.</u>

http://bit.ly/1Ylj6Bd

The Accused Product comprises a multiplexer adapted to effect division of the communications channel into sub-channels, e.g., in the Accused Product the 2.4 GHz frequency spectrum is divided into communications channels for 802.11b/g, and communications channels for 802.11n. For example, there are 14 sub-channels within the 2.4 GHz band. (see below).



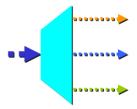
and

MCS			Spatial	Data Rate (Mbps) with 20 MHz CH		Data Rate (Mbps) with 40 MHz CH	
Index Type	Streams		800 ns	400 ns (SGI)	800 ns	400 ns (SGI)	
0	BPSK	1/2	1	6.50	7.20	13.50	15.00
1	QPSK	1/2	1	13.00	14.40	27.00	30.00
2	QPSK	3/4	1	19.50	21.70	40.50	45.00
3	16-QAM	1/2	1	26.00	28.90	54.00	60.00
4	16-QAM	3/4	1	39.00	43.30	81.00	90.00
5	64-QAM	2/3	1	52.00	57.80	108.00	120.00
6	64-QAM	3/4	1	58.50	65.00	121.50	135.00
7	64-QAM	5/6	1	65.00	72.20	135.00	150.00
8	BPSK	1/2	2	13.00	14.40	27.00	30.00
9	QPSK	1/2	2	26.00	28.90	54.00	60.00
10	QPSK	3 / 4	2	39.00	43.30	81.00	90.00
11	16-QAM	1/2	2	52.00	57.80	108.00	120.00
12	16-QAM	3/4	2	78.00	86.70	162.00	180.00
13	64-QAM	2/3	2	104.00	115.60	216.00	240.00
14	64-QAM	3 / 4	2	117.00	130.00	243.00	270.00
15	64-QAM	5/6	2	130.00	144.40	270.00	300.00
16	BPSK	1/2	3	19.50	21.70	40.50	45.00
31	64-QAM	5/6	4	260.00	288.90	540.00	600.00

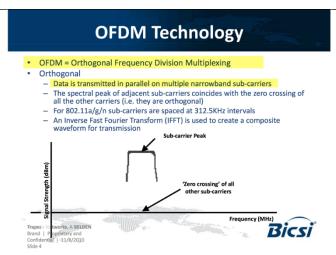
http://airmagnet.flukenetworks.com/assets/whitepaper/WP-802.11nPrimer.pdf

Both 802.11g and 802.11n traffic is handled through an OFDM (orthogonal frequency division multiplexing) multiplexing scheme whereby data in a communication channel is split into N parallel data streams or multiple "subcarriers" (i.e., sub-channels). The OFDM scheme for the 802.11n standard allows for the 802.11n to handle higher data rates than 802.11g and earlier standards.

An OFDM system takes a data stream and splits it into N parallel data streams, each at a rate 1/N of the origin rate.



http://www.polytech2go.fr/topnetworks/lectures/book16pe1.pdf

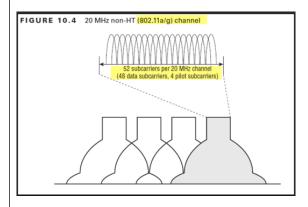


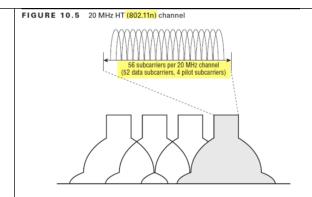
https://www.bicsi.org/uploadedfiles/PDFs/Conferences/singapore2010/day2/2.8 %20802.11n%20Deployment%20-%20Alfred%20Chan,%20Trapeze.pdf

The communications channel is divided asymmetrically whereby data-carrying capacity of the sub-channels are unequal. 802.11g (20 MHz channel) data is divided into 52 sub-carriers (sub-channels) and 802.11n (20 MHz channel) data is divided into 56 sub-carriers (sub-channels). Using the 20MHz channel for 802.11n allows connection with legacy devices using 802.11a/g 20 MHz channels.

- · Frequency Division
  - 802.11a/g 20MHz channels: 52 sub-carriers (48 data, 4 pilot)
  - 802.11n 20MHz channels: 56 sub-carriers (52 data, 4 pilot)
  - 802.11n 40MHz channel: 114 sub-carriers (108 data, 6 pilot)
- Multiplexing
  - Blocks of data are multiplexed across the sub-carriers
  - Data is modulated on the channel using BPSK, QPSK, 16 or 64 QAM with FEC

https://www.bicsi.org/uploadedfiles/PDFs/Conferences/singapore2010/day2/2.8 %20802.11n%20Deployment%20-%20Alfred%20Chan,%20Trapeze.pdf





#### http://mrncciew.com/2014/10/19/cwap-802-11n-introduction/

The data-carrying capacity of the sub-channels are unequal -- 802.11g has a maximum data rate of 54 Mb/s and 802.11n has a maximum data rate of about 300 Mb/s.

MCS Index	Туре	Coding Rate	Spatial Streams	Data Rate (Mbps) with 20 MHz CH		Data Rate (Mbps) with 40 MHz CH	
				800 ns	400 ns (SGI)	800 ns	400 ns (SGI)
0	BPSK	1/2	1	6.50	7.20	13.50	15.00
1	QPSK	1/2	1	13.00	14.40	27.00	30.00
2	QPSK	3 / 4	1	19.50	21.70	40.50	45.00
3	16-QAM	1/2	1	26.00	28.90	54.00	60.00
4	16-QAM	3 / 4	1	39.00	43.30	81.00	90.00
5	64-QAM	2/3	1	52.00	57.80	108.00	120.00
6	64-QAM	3/4	1	58.50	65.00	121.50	135.0
7	64-QAM	5/6	1	65.00	72.20	135.00	150.0
8	BPSK	1/2	2	13.00	14.40	27.00	30.0
9	QPSK	1/2	2	26.00	28.90	54.00	60.0
10	QPSK	3 / 4	2	39.00	43.30	81.00	90.0
11	16-QAM	1/2	2	52.00	57.80	108.00	120.0
12	16-QAM	3 / 4	2	78.00	86.70	162.00	180.0
13	64-QAM	2/3	2	104.00	115.60	216.00	240.0
14	64-QAM	3 / 4	2	117.00	130.00	243.00	270.0
15	64-QAM	5/6	2	130.00	144.40	270.00	300.0
16	BPSK	1/2	3	19.50	21.70	40.50	45.0
31	64-QAM	5/6	4	260.00	288.90	540.00	600.0

http://airmagnet.flukenetworks.com/assets/whitepaper/WP-802.11nPrimer.pdf

Symbol duration =  $4 \mu s$ 

Data-carrying sub-carriers = 48

Coded bits / sub-carrier = 6 (64 QAM)

Coded bits / symbol =  $6 \times 48 = 288$ 

Data bits / symbol:  $3/4 \times 288 = 216$  bits/symbol

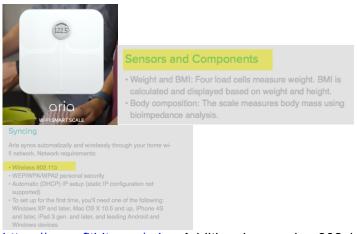
=> bit rate = 216 bits / 4  $\mu$ s = 54 Mb/s

http://www.polytech2go.fr/topnetworks/lectures/book16pe1.pdf

b) the data rate required for data transmission from said local sensors differing substantiall y between said at least two sensors; and

The accused product is 802.11b/g/n compliant and therefore is configured to adapt to both types of sensors, one which has 802.11b/g capability and the other which has 802.11n capability. The local data sensors (e.g., sensor(s) of the exemplary 802.11b/g device shown below, sensor(s) of the exemplary 802.11n device) to groups of sub-channels in accordance with different data rate requirements from the local sensors.

Exemplary 802.11b/g device with weight and impedance sensors:



https://www.fitbit.com/aria. Additional exemplary802.11b/g sensors include wireless temperature, air pressure, and humidity sensors. http://www.omega.com/pptst/wSeries.html

The network, at least during internal testing and use, may in addition include a second data sensor (e.g., camera sensor as shown in the exemplary 802.11n device below) located on a 802.11n device that also communicates with the Accused Device's 2.4 GHz communications channel. These devices using the 802.11n standard have a higher throughput than is allowed under the 802.11b/g standard.

Exemplary 802.11n device with a digital camera and accompanying image sensor (e.g., CMOS, CCD, and other variations):



The cream of the current Fire OS tablet crop, the 8.9-inch device first launched in Sept 2013, and was refreshed this September. with a starting sticker price of \$429 USD. It packs a 2,560 x 1,600 pixel display, a Qualcomm Inc. (QCOM) Snapdragon 805 chip (quad-core, 2.5 GHz), 2 GB of LPDDR3, and 802.11n Wi-Fi.

http://bit.ly/1YIj6Bd

For example, when an 802.11b/g device communicates with the Accused Product, because the device can only send data at the data rate of the slower 802.11b/g standard, the Accused Product assigns the 802.11b/g device to an 802.11b/g channel. 802.11b/g data is allocated to the 48 data sub-channels

(see below) in accordance with the data rate requirements of the 802.11b/g device's sensor, with 54 Mbps being the maximum data rate allocable to the 802.11 b/g device.

Symbol duration =  $4 \mu s$ 

Data-carrying sub-carriers = 48

Coded bits / sub-carrier = 6 (64 QAM)

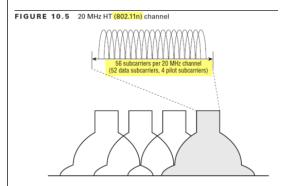
Coded bits / symbol =  $6 \times 48 = 288$ 

Data bits / symbol: 3/4 x 288 = 216 bits/symbol

=> bit rate = 216 bits / 4  $\mu$ s = 54 Mb/s

http://www.polytech2go.fr/topnetworks/lectures/book16pe1.pdf

For example, when an 802.11n device communicates with the Accused Product, because the device can sends data at the substantially higher data rate of the 802.11n standard, the Accused Product assigns the 802.11n device to an 802.11n channel. 802.11n data (from e.g., the 802.11n device's video sensor) is allocated to 52 sub-channels (see below) in accordance with the data rate requirements of the 802.11n device's sensor, with 300 Mbps being the maximum data rate allocable to the 802.11n device.

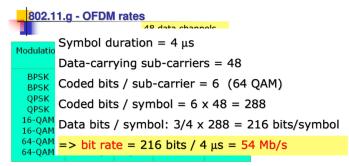


http://mrncciew.com/2014/10/19/cwap-802-11n-introduction/

The data-carrying capacity of the sub-channels are unequal -- 802.11g has a maximum data rate of 54 Mb/s and 802.11n has a maximum data rate of 300 Mb/s.

MCS Index Type	_	Coding	Spatial	Data Rate (Mbps) with 20 MHz CH		Data Rate (Mbps) with 40 MHz CH	
	Rate	Streams	800 ns	400 ns (SGI)	800 ns	400 ns (SGI)	
0	BPSK	1/2	1	6.50	7.20	13.50	15.00
1	QPSK	1/2	1	13.00	14.40	27.00	30.00
2	QPSK	3 / 4	1	19.50	21.70	40.50	45.00
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http://airmagnet.flukenetworks.com/assets/whitepaper/WP-802.11nPrimer.pdf



http://www.polytech2go.fr/topnetworks/lectures/book16pe1.pdf

c) allocating data from said local data sensors to respective ones or groups of said subchannels in accordanc e with the data carrying capacities of said subchannels.

The Accused Product includes is configured to allocate data from said local data sensors (e.g., sensor(s) of the exemplary 802.11b/g device shown below, sensor(s) of the exemplary 802.11n device) to groups of sub-channels in accordance with different data rate requirements from the local sensors.

Exemplary 802.11b/g device with weight and impedance sensors:



https://www.fitbit.com/aria. Additional exemplary802.11b/g sensors include wireless temperature, air pressure, and humidity sensors. http://www.omega.com/pptst/wSeries.html

The network, at least during internal testing and use, may in addition include a second data sensor (e.g., camera sensor as shown in the exemplary 802.11n device below) located on a 802.11n device that also communicates with the Accused Device's 2.4 GHz communications channel. These devices using the 802.11n standard have a higher throughput than is allowed under the 802.11b/g standard.

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For example, when an 802.11b/g device communicates with the Accused Product, because the device can only send data at the data rate of the slower 802.11b/g standard, the Accused Product assigns the 802.11b/g device to an 802.11b/g channel. 802.11b/g data is allocated to the 48 data sub-channels (see below) in accordance with the data rate requirements of the 802.11b/g device's sensor, with 54 Mbps being the maximum data rate allocable to the 802.11 b/g device.

Symbol duration =  $4 \mu s$ 

Data-carrying sub-carriers = 48

Coded bits / sub-carrier = 6 (64 QAM)

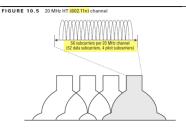
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=> bit rate = 216 bits / 4  $\mu$ s = 54 Mb/s

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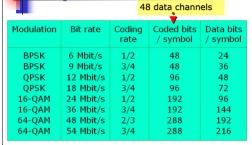
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31	64-QAM	5/6	4	260.00	288.90	540.00	600.00

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